Amendments to the Claims

Claim 1 (canceled)

Claim 2 (currently amended): A method for determining characteristics of a film on a wafer in a processing chamber, said method comprising:

impinging multiple wavelength optical radiation upon said film;

sensing multiple wavelength optical radiation reflected by said film to form spectral reflectance signals in a form of intensity versus wavelength containing information concerning interference fringes; and

obtaining thickness information of said film;

~~The method as recited in claim 1~~ wherein ~~measuring~~ obtaining said thickness information further includes reforming said spectral reflectance signals into a form of intensity versus a reciprocal of wavelength ~~obtaining wavelength information from said spectral reflectance signals by mapping said spectral signals to a wavelength domain, defining wavelength domain information, and forming a reciprocal pattern of said wavelength domain information~~ and obtaining thickness information as a function of a distance between adjacent maxima or minima of the reformed spectral reflectance signals.

Claim 3 (currently amended): The method as recited in claim [[1]] 2 further including mapping the reformed spectral reflectance signals ~~mapping said thickness information~~ into a frequency domain and determining a thickness of said film as a function of frequency of a peak of intensity in the frequency domain.

Claim 4 (currently amended): The method as recited in claim 3 further including determining an etch rate of said film as a function of a change in said frequency of said peak over ~~during~~ an interval of time.

Claim 5 (currently amended): The method as recited in claim [[1]] 2 wherein sensing optical radiation reflected by said film further includes collecting, with a lens assembly, cylindrical radiation reflected from a subportion of said film.

Claim 6 (currently amended): The method as recited in claim [[1]] 2 wherein sensing optical radiation reflected by said film further includes collecting, with a lens

assembly, said reflected radiation and collimating said reflected radiation with said lens assembly.

Claim 7 (currently amended): The method as recited in claim [[1]] 2 wherein said optical radiation reflecting from said wafer includes a first bundle of rays reflecting from a first interface and a second bundle of rays reflecting from a second interface, with said first interface being defined by a boundary of said film and said wafer, and said second interface being defined by a boundary of said film and an ambient, with said interference fringes being formed from interference of said first and second bundle of rays.

Claim 8 (currently amended): The method as recited in claim [[1]] 2 wherein impinging multiple wavelength optical radiation further includes exposing said wafer to plasma to produce optical radiation.

Claim 9 (currently amended): The method as recited in claim [[1]] 2 wherein impinging multiple wavelength optical radiation further includes exposing said wafer to white light.

Claim 10 (currently amended): The method as recited in claim [[1]] 2 wherein said wafer further includes a layer disposed between said wafer and said film, and further including mapping said ~~thickness information~~ reformed spectral reflectance signals into a frequency domain as a plurality of peaks, with a first of said plurality of peaks [[be]] being centered about a first frequency and a second of said plurality of peaks being centered about a second frequency, with said first frequency corresponding to a thickness of said film and said second frequency corresponding to a thickness of said layer.

Claim 11 (currently amended): A method for determining characteristics of a film on a wafer, said method comprising:

impinging multiple wavelength optical radiation upon said film;

sensing multiple wavelength optical radiation reflected by said film to form spectral reflectance signals in a form of intensity versus wavelength;

~~plotting said spectral reflectance signals as intensity versus wavelength, defining wavelength information;~~

reforming the spectral reflectance signals into a form of intensity versus a reciprocal of wavelength ~~producing a reciprocal pattern by replotting said wavelength domain information as intensity versus a reciprocal of said wavelength, with said reciprocal pattern being defined as 1/λ~~; and

obtaining frequency information ~~associated with said reciprocal pattern~~ by mapping said reformed spectral reflectance signals ~~reciprocal pattern~~ into a frequency domain and determining film characteristics as a function of ~~said~~ frequency information related to peaks of intensity in the frequency domain, said film characteristics including a thickness of said film.

Claim 12 (currently amended): The method as recited in claim 11 wherein said wafer further includes a layer disposed between said wafer and said film and wherein said ~~obtaining frequency information further includes~~ mapping ~~said thickness information into a frequency domain as~~ provides a plurality of peaks, with a first of said plurality of peaks being centered about a first frequency and a second of said plurality of peaks being centered about a second frequency, with said first frequency corresponding to a thickness of said film and said second frequency corresponding to a thickness of said layer.

Claim 13 (currently amended): The method as recited in claim [[14]] 12 further including determining an etch rate of said film as a function of a change in said first frequency during an interval of time.

Claim 14 (original): The method as recited in claim 13 wherein sensing optical radiation reflected by said film further includes collecting, with a lens assembly, cylindrical radiation reflected from a subportion of said film.

Claim 15 (original): The method as recited in claim 14 wherein sensing optical radiation reflected by said film further includes collimating said cylindrical radiation with said lens assembly.

Claim 16 (original): The method as recited in claim 15 wherein said optical radiation reflecting from said wafer includes a first bundle of rays reflecting from a first interface and a second bundle of rays reflecting from a second interface, with said first interface being defined by a boundary of said film and said wafer, and said second interface being defined by a

boundary of said film and an ambient, with said interference fringes being formed from interference of said first and second bundle of rays.

Claim 17 (currently amended): The method as recited in claim 16 wherein impinging optical radiation further includes exposing said wafer to white light.

Claim 18 (original): The method as recited in claim 16 wherein impinging optical radiation further includes exposing said wafer to plasma to produce optical radiation.

Claim 19 (currently amended): An apparatus for determining characteristics of a film on a wafer, said apparatus comprising:

means for impinging multiple wavelength optical radiation upon said wafer;

means for sensing multiple wavelength optical radiation reflected by said film to form spectral reflectance signals in a form of intensity versus wavelength containing information concerning interference fringes;

~~means for measuring characteristics of said film as a function of a periodicity of said interference fringes, said characteristics including thickness~~

means for reforming said spectral reflectance signals into a form of intensity versus a reciprocal of wavelength; and

means for obtaining thickness information as a function of a distance between adjacent maxima or minima of the reformed spectral reflectance signals.

Claim 20 (canceled)

Claim 21 (currently amended): An apparatus for determining characteristics of a film on a wafer, said apparatus comprising:

a process chamber to contain said wafer;

a system to generate multiple wavelength optical radiation, with said multiple wavelength optical radiation impinging upon said film;

a spectrum analyzer having a detector in optical communication with said process chamber to sense multiple wavelength optical radiation reflected by said film and resolve, from said optical radiation, spectral reflectance signals in a form of intensity versus wavelength containing information concerning interference fringes;

a processor in communication with said spectrum analyzer; and

a memory in communication with said processor, said memory comprising a computer-readable medium having a computer-readable program embodied therein, said computer-readable program including a set of instructions to cause said processor to operate on said information and obtain thickness information of said film;

~~The apparatus as recited in claim 20~~ wherein said set of instructions ~~further~~ includes a subroutine to cause said processor to reform ~~operate on~~ said spectral reflectance signals in a form of intensity versus a reciprocal of wavelength ~~to obtain wavelength information therefrom by mapping said spectral signals to a wavelength domain, defining wavelength domain information, and forming a reciprocal pattern of said wavelength information~~ and to obtain thickness information as a function of a distance between adjacent maxima or minima of the reformed spectral reflectance signals.

Claim 22 (currently amended): The apparatus as recited in claim [[20]] 21 wherein said set of instructions further includes an additional subroutine to cause said processor to map said ~~reciprocal pattern~~ reformed spectral reflectance signals into a frequency domain and determine said thickness as a function of frequency of a peak of intensity in the frequency domain.

Claim 23 (currently amended): The apparatus as recited in claim [[20]] 21 wherein said set of instructions further includes a first subroutine to cause said processor to map said ~~reciprocal pattern~~ reformed spectral reflectance signals into a frequency domain and determine said thickness as a function of frequency of a peak of intensity in the frequency domain and a second subroutine to determine an etch rate of said film as a function of a change in said frequency of said peak over an interval of time.

Claim 24 (currently amended): The apparatus as recited in claim [[20]] 21 further including a plasma generation apparatus in data communication with said processor to generate a plasma within said process chamber, wherein said system to generate multiple wavelength optical radiation includes a light source.

Claim 25 (currently amended): The apparatus as recited in claim [[20]] 21 further including a lens assembly disposed between said ~~processing~~ process chamber and said detector to collimate radiation reflected from said film.

Claim 26 (currently amended): The apparatus as recited in claim [[20]] 21 wherein further including a lens assembly disposed between said ~~processing~~ process chamber and said detector to collect cylindrical radiation reflected from said film.

Claim 27-28 (canceled)

Claim 29 (currently amended): An apparatus for determining characteristics of a film on a wafer, said apparatus comprising:

a process chamber to contain said wafer;

a system to generate multiple wavelength optical radiation, with said multiple wavelength optical radiation impinging upon said film;

a lens assembly disposed between said process chamber and said detector to collect cylindrical radiation reflected from said film and collimate said cylindrical radiation, defining collimated radiation;

a spectrum analyzer having a detector in optical communication with said lens assembly to sense said collimated radiation and produce spectral reflectance signals in a form of intensity versus wavelength having information concerning interference fringes;

a processor in communication with said spectrum analyzer; and

a memory in communication with said processor, said memory comprising a computer-readable medium having a computer-readable program embodied therein, said computer-readable program including a set of instructions to cause said processor to operate on said data to obtain thickness information of said film;

~~The apparatus as recited in claim 28~~ wherein said sets of instructions ~~further~~ includes a ~~an additional~~ subroutine to cause said processor to reform said spectral reflectance signals in a form of intensity versus a reciprocal of wavelength ~~obtain wavelength information from said spectral signals by mapping said signals to a wavelength domain, defining wavelength domain information, and forming a reciprocal pattern of said wavelength information~~ and to obtain thickness information as a function of a distance between adjacent maxima or minima of the reformed spectral reflectance signals.

Claim 30 (currently amended): The apparatus as recited in claim 29 further including a second set of instructions to cause said processor to map said ~~reciprocal pattern~~

reformed spectral reflectance signals into a frequency domain and determine said thickness as a function of frequency of a peak of intensity in the frequency domain.

Claim 31 (currently amended): The apparatus as recited in claim 30 wherein said second set of instructions further includes a first subroutine to determine an etch rate of said film as a function of a change in said frequency of said peak over an interval of time.

Claim 32 (new): The method of claim 2 wherein the thickness is the distance between adjacent maxima or minima multiplied by two times the index of refraction of the film.

Claim 33 (new): The method of claim 19 wherein means for obtaining thickness information determines the thickness as the distance between adjacent maxima or minima multiplied by two times the index of refraction of the film.

Claim 34 (new): The method of claim 21 wherein the subroutine to cause the processor to obtain thickness information causes the processor to determine the thickness as the distance between adjacent maxima or minima multiplied by two times the index of refraction of the film.

Claim 35 (new): The method of claim 29 wherein the set of instructions to cause the processor to obtain thickness information causes the processor to determine the thickness as the distance between adjacent maxima or minima multiplied by two times the index of refraction of the film.